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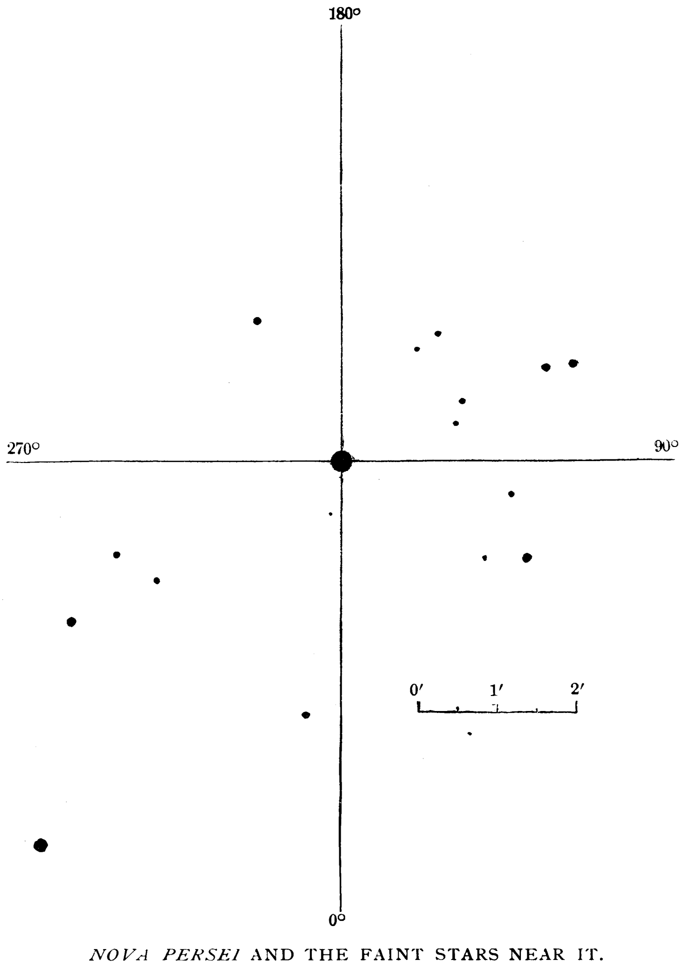

NOVA PERSEI AND THE FAINT STARS NEAR IT.

NOTICES FROM THE LICK OBSERVATORY.*

PREPARED BY MEMBERS OF THE STAFF.

NOVA PERSEI.

The discovery of a new star in the constellation *Perseus*, by Dr. T. D. ANDERSON, a private astronomer of Edinburgh, on the morning of February 22d, is one of the most interesting astronomical events of recent times. The discovery was announced by Professor COPELAND, Astronomer Royal for Scotland, with the following statement:—

"The great new star was discovered by Dr. T. D. ANDERSON, of this city, at 2:40 A.M. on Friday, 22d inst. At that time it was of the 2.7 magnitude, or fully half a magnitude fainter than the Pole Star, and shone with a bluish white light. Dr. ANDERSON himself kindly brought the news of this important discovery to the observatory in the forenoon, and marked off the exact position of the *Nova* on the map in ARGELANDER'S great atlas of the northern heavens. Dr. ANDERSON'S reputation as the discoverer of *Nova Aurigæ* in 1892, and of more than a score of telescopic variable stars, placed the reality of this new discovery beyond all doubt; so telegrams were at once dispatched to Greenwich and to Kiel for distribution to the observatories of the world.

"Evening had scarcely closed in when the *Nova* could be seen with the naked eye, even through light drifting clouds. To my eye it appeared to be of the first magnitude, being slightly brighter than *Aldebaran*. On examining its spectrum, we were astonished to find it almost absolutely continuous, and it was only after some time that Dr. HALM detected a number of delicate dark (Fraunhofer) lines, which I was able to confirm. Unfortunately, the sky clouded over before further critical observations could be made. Mr. HEATH was so fortunate as to secure a photograph of the new star at a time when all the neighboring stars were obscured by thick haze. The night of the 23d was very cloudy, and spectroscopic observations were impossible; but when, through a break in the clouds about 8 P.M., Dr. HALM and Mr. CLARK saw the star, they clearly made it out to be brighter than *Capella*, in fact to be the brightest star north of the celestial equator.

"A new special feature of this, the most considerable new star of modern times, is its enormous increase in brightness since its discovery, while all other new stars seem to have been discovered when at their greatest brilliancy, from which they rapidly declined.

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"Dr. ANDERSON'S place of the *Nova* for 1901 is: Right Ascension, $3^h\ 24^m\ 25^s$; North Declination, 43° 34′, or a little following the center of the line joining the stars *Beta* and *Delta*, in the constellation of *Perseus*."

It may be said that the resources of nearly all the active observatories were at once devoted to the study of the wonderful stranger, in so far as they promised to yield useful results.

A fact of great interest was promptly announced by Professor E. C. PICKERING, Director of Harvard College Observatory. Photographs of this region of the sky had been secured, in the course of their regular surveys, on February 2d, 6th, 8th, 18th, and 19th, none of which recorded a star in the position of the *Nova*, though the last plate contained images of 11th-magnitude stars. The *Nova* thus increased from fainter than 11th magnitude to the 2.7 magnitude in less than three days; and on the 24th had become the brightest star in the northern hemisphere.

The first opportunity for securing observations at Mt. Hamilton occurred on the forenoon of February 24th. There was no difficulty in finding it with the 12-inch telescope, in broad daylight. Comparison of the brightness of the *Nova* with that of *Capella* showed that the former was half a magnitude the brighter.

The position of *Nova Persei* was determined from meridian-circle observations by Professor TUCKER on eight consecutive nights, from February 24th to March 3d, to be

$$\text{Right Ascension} = 3^h\ 24^m\ 28^s.086$$
$$\text{Declination} = 43^\circ\ 33'\ 54''.03$$

referred to the mean equinox of 1901.0. Readers will have no difficulty in locating the *Nova*, by means of these coordinates, in their star-charts.

The position of the *Nova* with reference to a number of neighboring faint stars has been accurately determined by Mr. AITKEN, using the micrometer of the 36-inch refractor.

Mr. PALMER has secured photographs of *Nova Persei* and the surrounding stars, and has measured its position with reference to four catalogue stars on the plates.

The brightness of the star has been estimated on every clear night by Messrs. TUCKER and AITKEN. It has diminished from zero magnitude, on February 24th, to the fourth magnitude and fainter, the latter part of March, in an irregular manner.

Our two single-prism spectrographs having just been shipped to Sumatra, the spectroscopic observations on February 24th were made with the Mills spectrograph. On the 25th and succeeding nights efficient one-prism instruments were available. Those fortunate enough to secure observations on the 22d and 23d reported that the spectrum was practically continuous, traversed by dark lines, on those dates. Observations secured here and elsewhere on the 24th and later showed that the spectrum was rapidly approaching the type of new-star spectrum exemplified by *Nova Aurigæ*, discovered by Dr. ANDERSON in 1892; and by *Nova Normæ* (1893), *Nova Carinæ* (1895), *Nova Sagittarii* (1898), and *Nova Aquilæ* (1899), discovered by Mrs. FLEMING on the Draper Memorial Photographs. Some minor points of difference exist; but the general features are the same, leaving no doubt that all these new stars exemplify the same class of phenomena.

The bright bands which were very prominent in *Nova Aurigæ* are present, with greater width, in *Nova Persei.* The stronger bands have, similarly, dark bands on their violet edges. The contrasts between bright and dark bands are weaker in the present star than in that of 1892.

It was noticed on the 25th of February that the D_1 and D_2 lines of sodium are present as narrow dark lines within the broad bright D band. A little later the fine dark H and K lines were found in the broad bright calcium bands. These were utilized at once for determining the velocity of *Nova Persei* in the line of sight. Observations from February 25th to March 18th yielded fairly consistent values of 6 kilometers per second recession from the solar system, depending upon the sodium and calcium lines.

A large number of beautiful spectrum plates have been secured, which Mr. WRIGHT is engaged in measuring and reducing preparatory to their publication in detail.

The cause of this star's sudden appearance is unknown. It undoubtedly existed previously as a dark and invisible star, or stars, in its present position. Some astronomers are inclined to hold to the view that we are dealing with two bodies traveling through space with an enormous relative velocity; but it seems to me that the substantial agreement of the features of the last half-dozen new-star spectra is practically conclusive evidence against this theory; and the work of WILSING shows that such an hypothesis is unnecessary. Likewise, the theory that the phenomena are caused by a dark body rushing violently through a nebulous cloud seems to be too special to fit a uniform class of phenomena. Whether a stupendous volcanic outburst from one star, whatever its cause, or the collision of two dark bodies, could supply the observed facts, remains in doubt. The spectrum contains sufficient proof that the atmosphere of the star is disturbed in the extreme. W. W. CAMPBELL.

March 31, 1901.

NOVA PERSEI AND THE FAINT STARS NEAR IT.

The following measures were made for the purpose of locating the faint stars that are visible in the telescope close to the new star discovered by ANDERSON. All the stars that could be seen with the 36-inch telescope within 3′ of the *Nova* were measured, as well as a few that are more distant. As all of these stars are quite faint, the new star was also connected with the 9.0-magnitude star (Bonn A. G. Catal., 2948), which is about 6′ north of and preceding it.

The observing conditions on all the nights available for these measures were not very favorable, and the measures of distance were nearly all difficult. This was especially the case with the nearest star (*a*), which was at the limit of vision. The estimates of magnitude must be considered as relative rather than absolute. In addition to the estimates made on the nights of the measures, the following comparative estimate was made on March 29th: $o = 12.5$; $k = i = f = 13.0$; $l = m = 13\frac{1}{4}$; $j = c = 13.5$; $g = h = n = 14.0$; $b = 14\frac{3}{4}$; $e = 15.5$; $d = 16.0$; *a*, not visible.

The diagram facing page 65 shows the relative positions of these stars.

Nova and *a*.

Date.	Angle.	Distance.	Magnitude.
1901.184	348°.0	39″.39	—16.5
.203	348 .7	40 .28	—16.5
1901.19	348°.4	39″.82	—16.5

b.

Date.	Angle.	Distance.	Magnitude.
1901.184	107°.9	90″.86	—14.5
.239	108 .1	91 .88	—14.5
1901.21	108°.0	91″.37	—14.5